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ABSTRACT

This instructor's manual and student learning activity guide comprise a kit for trade and industrial education (T & I) activities on electric motors. Purpose stated for the activities is to teach the student the four basic types of electric motors, the advantages and disadvantages of each, the types of jobs each can perform, and how to disassemble and reassemble an electric motor. The instructor's manual contains information on activity duration, lists of goals and instructional objectives, vocational clusters, materials for activity implementation (description, safety, materials required, preparation prior to class, classroom techniques, followup activities), answer key, and duplication masters (occupational fact sheet, worksheets). The student learning activity guide provides an introduction, a list of goals, directions, a list of required materials, and a programmed text. The programmed text presents each instructional objective, illustrated steps to follow to accomplish the objective, and check point instructions. Occupational descriptions are appended. (YLB)

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ED260247

T & I - ELECTRIC MOTORS

Kit No. 621

INSTRUCTOR'S MANUAL

AND

STUDENT LEARNING ACTIVITY

GUIDE

State Department of Education
Office of Vocational Education
Prevocational Education
Columbia, South Carolina 29201

1985

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TITLE OF ACTIVITY

Kit No. 621 T & I
Electric Motors

DURATION

Main Activity: 3 – 6 periods
Follow-up Activity: 2 – 4 periods

GOALS

1. The student will learn the advantages of using electric motors on the farm.
2. The student will learn the four basic types of electric motors, the advantages of each, the disadvantages of each, and the types of jobs that each can perform.
3. The student will learn and be able to interpret information found on the nameplate of an electric motor.
4. The student will be able to demonstrate his/her ability to disassemble an electric motor, clean the motor, identify the motor parts, and reassemble it properly.

INSTRUCTIONAL OBJECTIVES

1. Each student will list at least 13 advantages found by using an electric motor rather than a gas engine.
2. Each student will list 5 advantages found using a split-phase motor.
3. Each student will identify and list 3 disadvantages of a split-phase motor.
4. Each student will identify 5 machines operated with the use of a split-phase motor.
5. Each student will identify the advantages of a capacitor-type electric motor.
6. Each student will identify four disadvantages of a capacitor-type motor.
7. Each student will identify three machines operated by a capacitor motor.
8. Each student will write four advantages of the repulsion-start-induction-run motor.
9. Each student will list three disadvantages of the repulsion-induction motor.
10. Each student will identify 3 machines using a repulsion-induction motor.
11. Each student will determine the difference between single- and three-phase electricity.
12. Each student will identify four advantages of a three-phase motor.
13. Each student will list four disadvantages of a three-phase motor.
14. Each student will identify 2 machines which use a three-phase motor.
15. Given a comparison chart of electric motors, each student will answer 10 questions comparing split-phase, repulsion-induction, capacitor, and three-phase electric motors.
16. Each student will identify and label the parts of a motor nameplate.
17. Students working in pairs will disassemble a split-phase motor and clean the points.
18. Both students will reassemble the motor.

VOCATIONAL CLUSTERS

Trade and Industry

ACTIVITY IMPLEMENTATION

A. Description

For best results objectives 1–16 of this activity should be done individually. Objectives 17 and 18 should be done in groups of two. The four basic types of electric motors, the advantages and disadvantages of each, and the types of jobs that each can perform will be studied in this activity. The student will be able to interpret the nameplate on electric motors and will disassemble and reassemble an electric motor.

B. Safety

Students should wear safety glasses while completing objectives 17 and 18.

C. Materials Required

1. Audio Visual Equipment
   None

2. Technical Equipment
   13 Split-phase motors
   13 Standard screwdrivers
   13 Adjustable Wrenches (6 inches)
   13 Rubber mallets
   6 Ball peen hammers
   1 Center punch
   25 Pairs of safety glasses
   6 Drive socket sets (3/8 inch)
3. Expendable Supplies
   Sandpaper
   Clean rags
   Hand cleaner

D. Preparation Prior to Class

Read the student activity booklet to familiarize yourself with the entire activity. From the masters for duplication remove worksheets 1 – 7 and reproduce enough copies for each student in your class. Instruct the students to write on the copies you give them. Also, if you wish you can have the student turn in his/her work at the end of each objective for you to check to see if they have successfully completed the objective.

Be sure to secure all materials before implementation, and be available should you have students who complete their work ahead of others.

Emphasize careers that students may wish to enter that involve working with electric motors or equipment that is operated by electric motors. Although no direct mention of careers is made in the Student Activity Guide, you should emphasize career opportunities all along as you supervise your students.

Before beginning objectives 17 and 18, it is advisable to be sure that all students in the class have finished objectives 1 – 16. Then all students will be working on the assembly and disassembly at the same time, allowing you more time to help students on this "hands on" activity.

For objectives 17 and 18 be sure that you are familiar with the nomenclature of the split-phase electric motor. When the students complete activity 17, teach them the names of five of the parts of the motor while they look at each part. This is optional.

E. During Class Session

INTRODUCTION – The instructor can read aloud the introduction used in the student manual. Also, the activities found in this guide should help you become more familiar with the types of electric motors that are found around the home and farm, and the various functions that they perform. As you work on this activity, think of the many career opportunities that are involved with working on electric motors as found in the VIEW materials.

TO THE TEACHER – After distributing booklets make sure that all students have copies of the worksheets that they will need for that day. Instruct students not to write in the activity booklet.

Give the students the go ahead after completing each objective by checking their worksheets. (You should take these up at the end of the period and return them the next day.)

Do not show the students the motor or tools they will be using in objective 17 until all have successfully completed objective 16. Only when everyone has reached this point should you allow students to see the equipment. If you have students who work faster than others, give them extra assignments – preferably dealing with career opportunities – until all students are ready to begin objective 17.

When students are using the tools and motors, DO NOT leave them unattended at any time. Be sure that all tools are returned at the end of the period and take another inventory of the equipment before the next class.

F. Follow-Up Activities

1. Students should read about two careers involving electric motors or motor repair from VIEW and complete a occupational Fact Sheet. Listed below are some Job Possibilities for further work with electric motors:
   A/C and Refrigeration Mechanic
   Appliance Serviceman
   Drill Press Operator
   Electrical Appliance Assembler

Farm Equipment Mechanic
Industrial Maintenance Mechanic
Machinist
Maintenance Man
Metal Machinery Foreman
Small Appliance Repairman
Tool and Die Maker
Tool Grinder Operator

2. Students should keep all worksheets in order and arrange neatly in a notebook to be referred to later.
3. If more evaluation on progress is needed, test the students on the material in their worksheets.
4. Plan a field trip to a good shop or factory if you have one in close proximity to the school, and have the students practice identifying the types of motors they see and the equipment they operate.
5. Invite an electric motor repairperson to come to your class and demonstrate how to overhaul an electric motor. (There are electric motor repair shops in almost every town.)

ANSWER KEY

Worksheet I

Instructional Objective I

1. Reasonably priced
2. Inexpensive to operate
3. Long life
4. Easy to operate
5. Quiet and safe
6. Can stand temporary overloads during operation
7. Can be controlled automatically or remotely by built-in controls
8. Compact in size
9. Can stand heat and/or cold without adjustments
10. No exhaust fumes
11. Little vibration
12. Can operate in most positions
13. Minimum fire hazard

Worksheet II

Instructional Objective II

1. Cheapest electric motor available
2. Available in sizes from 1/20 to 3/4 horsepower
3. Operates on single-phase power
4. Operates on 120 or 240 volt circuit
5. Used on easy starting loads which require little torque

Instructional Objective III

1. Can handle only easy starting loads; cannot handle heavy starting loads
2. Consumes 6 to 8 times operating current when starting
3. May cause lights to flicker when starting due to its heavy use of electrical starting power

Instructional Objective IV

1. Bench grinder stone wheels
2. Electric handsaw
3. Washing machine
4. Drill press
5. Hand drill

Worksheet III

Instructional Objective V

1. Uses single-phase power
2. Has a starting capacitor
3. Sizes range from 1/2 to 25 hp.
4. Used on hard-to-start loads

Instructional Objective VI

1. Draws excessive current when starting
2. May cause lights to blink because of the power it uses
3. High cost – 25 to 40% more than split-phase
4. Sizes above 1 hp cost 30 to 40% more than 3-phase

Instructional Objective VII

1. Steam cleaner
2. Radial arm saw
3. Air compressors

Worksheet IV

Instructional Objective VIII

1. Uses single-phase power
2. Requires 120 or 240 volt circuit
3. Sizes range from 1/6 to 20 hp.
4. Used on very hard-to-start loads

Instructional Objective IX

1. Speed will not remain constant, varies 5 to 10%
2. High initial cost
3. Requires periodic maintenance of mechanical parts

Instructional Objective X

1. Feed conveyors
2. Hammer mill
3. Metal lathe

Worksheet V

Instructional Objective XI

a. Single-phase electricity is the type electricity that is supplied by one transformer from the power pole to a building.
b. Three-phase electricity is the type electricity that is supplied by two transformers from the power pole to a building.

Instructional Objective XII

1. Used on difficult starting loads
2. Most rugged, reliable, satisfactory motor you can select
3. Runs at constant speed
4. Direction of rotation can easily be changed from clockwise to counter-clockwise

Instructional Objective XIII

1. Requires 3-phase electricity
2. Fractional hp size – high cost
3. Draws 3 to 4 times running current when starting
4. Wiring costs higher

Instructional Objective XIV

1. Planer
2. Textile looms

Worksheet VI

Instructional Objective XV

1. 1/20 to 3/4
2. single
3. 900 to 3600
4. yes
5. difficult
6. 1/2 to 25
7. 120 or 240, single
8. 1/6 to 20
9. inexpensive
10. 1/2 to 400+

Worksheet VII

Instructional Objective XVI

1. 1/2
2. 1700
3. speed of motor's shaft
4. thermoguard type
5. continuous
6. 40
7. open
8. 76851–B
9. when ordering parts
10. alternating

WORKSHEET I
ELECTRIC MOTORS

Advantages of electric motors on the farm.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

Can you think of more advantages? If so, write them below.

WORKSHEET II

SPLIT-PHASE MOTORS

Advantages of the split-phase motor.

1.

2.

3.

4.

5.

Disadvantages of the split-phase motor.

1.

2.

3.

Machines that operate on a split-phase motor.

1.

2.

3.

4.

5.

WORKSHEET III

CAPACITOR MOTOR

Advantages of the capacitor motor.

1.

2.

3.

4.

5.

Disadvantages of the capacitor motor.

1.

2.

Equipment that is operated by capacitor motors.

1.

2.

3.

Can you think of more? If so, list below.

WORKSHEET IV

REPULSION-INDUCTION MOTORS

Advantages of the repulsion-induction motor.

1.

2.

3.

4.

Disadvantages of the repulsion-induction motor.

1.

2.

3.

Equipment that may be operated by repulsion-induction motors.

1.

2.

3.

Can you think of more? If so, list below.

WORKSHEET V

THREE-PHASE MOTORS

Definition:

a. single-phase electricity

b. three-phase electricity

Advantages of three-phase motors.

1.

2.

3.

4.

Disadvantages of three-phase motors.

1.

2.

3.

4.

Equipment powered by three-phase motors.

1.

2.

WORKSHEET VI

Answer the following questions from the electric motor comparison chart.

1. Split-phase motors are available in sizes from _____ hp. to _____ hp.
2. Split-phase motors use _____phase electricity.
3. Split-phase motors operate in a range of _____ to _____ rpm's.
4. Are capacitor-start motors reversible?
5. Capacitor-start motors are used on _____ starting loads.
6. Capacitor motors range in sizes from _____ to _____ hp.
7. Repulsion-induction motors operate on _____ or _____ voltage, and _____phase electricity.
8. Repulsion-induction motors range in size from _____ to _____ hp.
9. Three-phase electric motors are relatively _____ (expensive or inexpensive) compared to their power.
10. Three-phase electric motors range in size from _____ to _____ hp.

WORKSHEET VII

Interpretation of electric motor nameplate.

1. What is the horsepower of the motor? _____
2. What is the rpm of the motor? _____
3. What does rpm tell you about this particular motor? _____
4. What type of overload protection does the motor have? _____
5. How long is the motor designed to operate? _____
6. Under what temperature will the motor operate? _____
7. What type of enclosure does the motor have? _____
8. What is the serial number? _____
9. When would you use the serial number of a motor? _____
10. What type of current does the motor use? _____

OCCUPATIONAL FACT SHEET

NAME _____ CLASS _____ OCCUPATION _____

REFERENCE
Use the South Carolina Occupational Information System (SCOIS) or the alternative references below to help you to answer the questions.

ALTERNATIVE REFERENCES
South Carolina State Employment Security Commission
South Carolina State Department of Labor
U.S. Department of Labor
Encyclopedia of Careers and Vocational Guidance
Dictionary of Occupational Titles
U.S. Department of Commerce
Professional and Trade Association
Business and Industrial Firms and Agencies

A. List the advantages (good points) of this occupation (job.)

B. List the disadvantages (bad points) of this occupation (job).

C. List three things you should know how to do in this occupation (job).
1.
2.
3.

D. What type of education should you get to be prepared (do) for this occupation (job)?

E. What courses must you take to go into this occupation (job)?

F. What do you think your future in this occupation (job) will be?

G. What wage can you expect in this occupation (job)?

H. What are the working hours of this occupation (job)?

I. To learn more about this occupation (job), write to:

J. Using a scale of 1 to 5, circle the number that measures your interest in this occupation (job) as a possible career.

12

I don't like it. 1 2 3 4 5 I like it.

T & I - ELECTRIC MOTORS

Kit No. 621

STUDENT
LEARNING ACTIIVITY GUIDE

State Department of Education
Office of Vocational Education
Prevocational Education
Columbia, South Carolina 29201

1985

T & I 621 ELECTRIC MOTORS

INTRODUCTION

Electricity is one of our most important sources of energy. Unfortunately people tend to take this precious commodity for granted. Electricity has become so commonplace that we automatically expect the light to come on when we flip a switch. We expect our hair dryer to operate when we plug it into an outlet. We need to become aware of electricity's many uses.

Electric motors are also important to us in our everyday living. Like electricity, electric motors are taken for granted by many people who automatically expect certain things to happen. In this guide you will examine how electric motors operate, the various types of motors and the advantages of each, how to interpret nameplate information, identify motor parts, and actually learn how to disassemble and reassemble an electric motor.

GOALS

1. Each student will learn the advantages and disadvantages of using electric motors on the farm.
2. The student will learn and be able to interpret information found on the nameplate of an electric motor.
3. The student will be able to demonstrate the ability to identify the motor parts, disassemble an electric motor, clean the motor and reassemble it.

DIRECTIONS

Read carefully each objective and step to be followed in this programmed text. Complete each step before going on to the next one. Always complete the requirements of each checkpoint before continuing to the next objective.

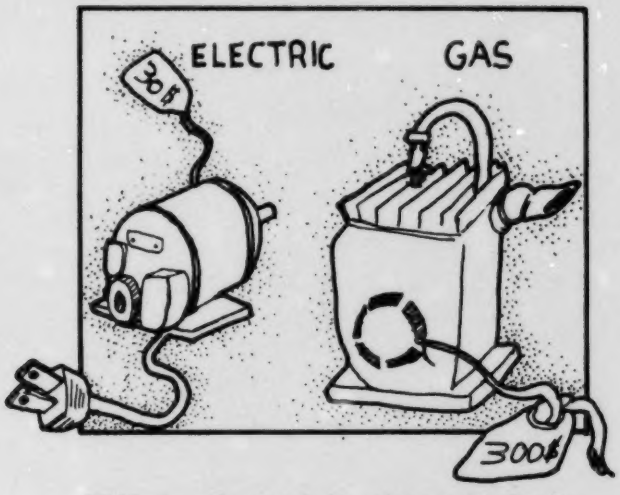
MATERIAL

Pencil
Paper
Split-phase motor
Standard screwdriver
Adjustable wrenches (6 inches)
Rubber mallet
Ball peen hammer
Center punch
Safety glasses
3/8 inch drive socket set

PROGRAMMED TEXT

Instructional Objective 1

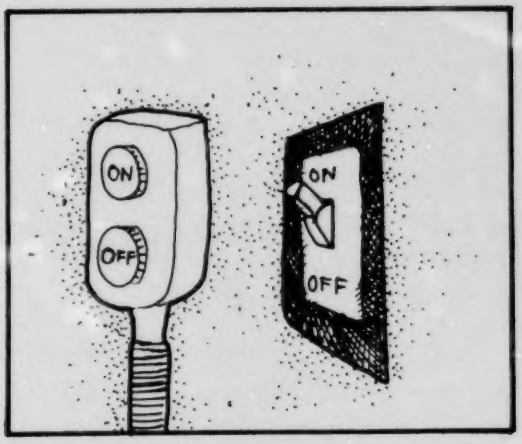
Each student will list at least 13 advantages found by using an electric motor rather than a gas engine.



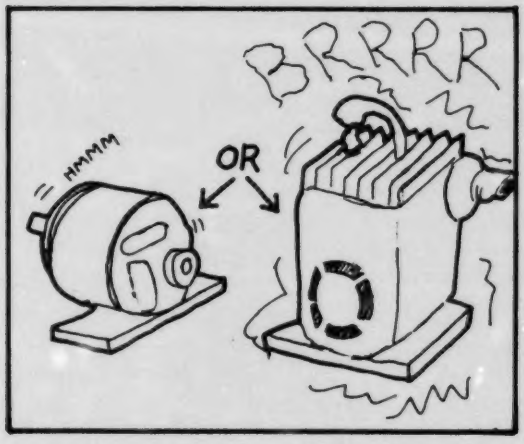
STEP 1 – Some of the advantages of using electric motors follow: Reasonably priced. The cost of an electric motor is less than a gas motor.

STEP 2 – Inexpensive to operate.

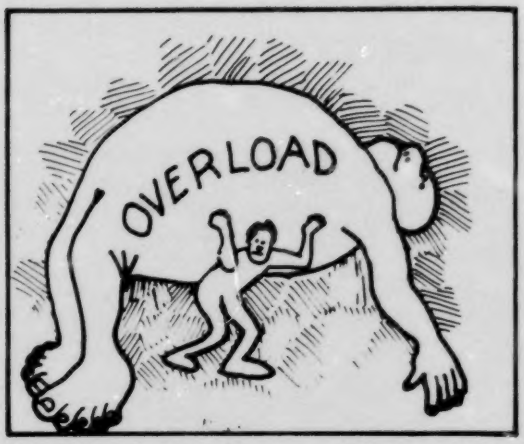
STEP 3 – Long life (20 – 30 years).



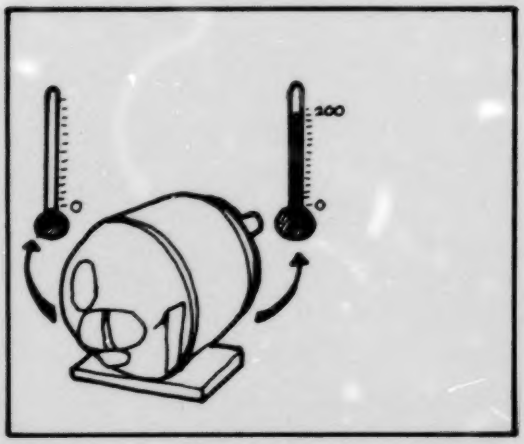
STEP 4 – Easy to operate. Anyone can turn a switch to an on-off position.



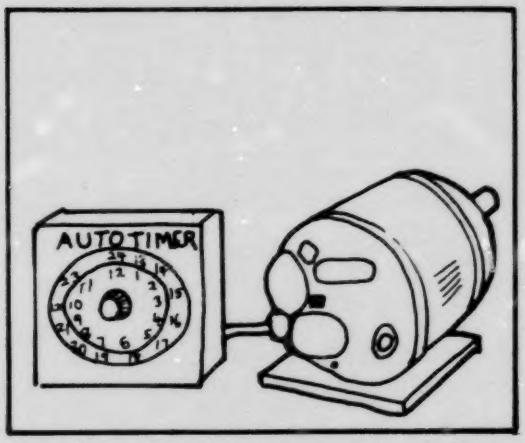
STEP 5 – Quiet and safe. Electric motors require no muffler devices.



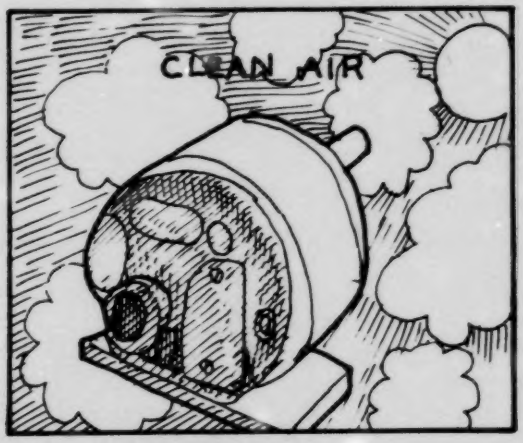
STEP 6 – Can stand temporary overloads during operation.



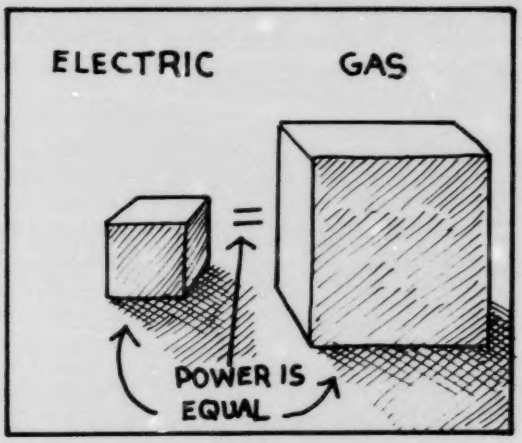
STEP 9 – Can stand heat and/or cold without adjustments.



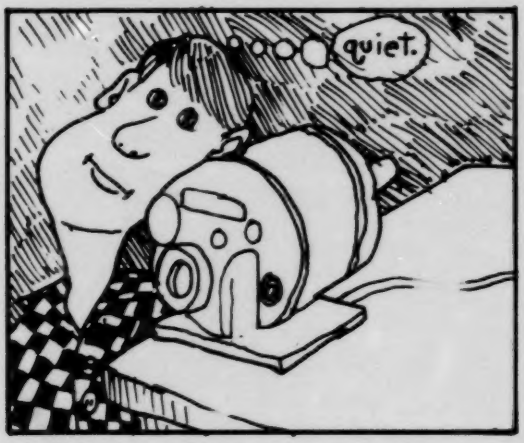
STEP 7 – Can be controlled automatically or remotely by built-in controls.



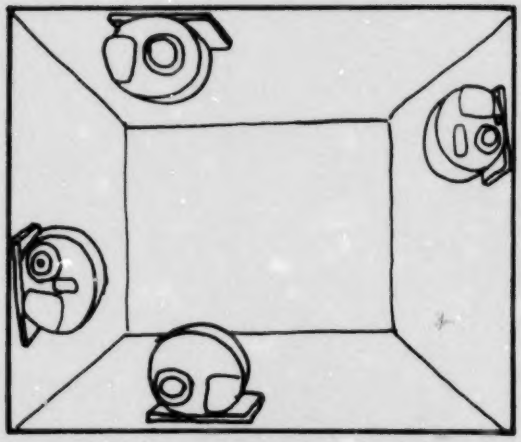
STEP 10 – No exhaust fumes.



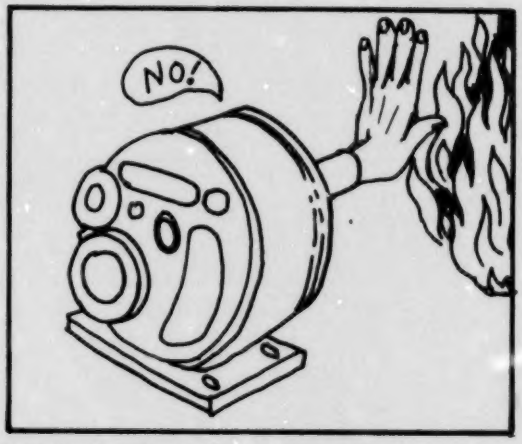
STEP 8 – Compact in size as compared to equivalent power gas engine.



STEP 11 – Little vibration.



STEP 12 – Can operate in most positions.



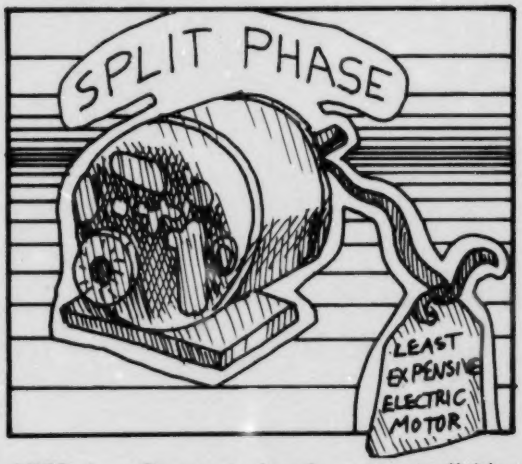
STEP 13 – Minimum fire hazard.

Check Point

List on Worksheet I the advantages of using an electric motor.

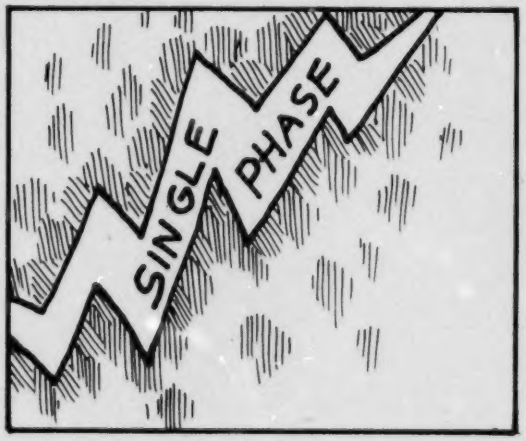
Instructional Objective

Each student will list 5 advantages found using a split-phase motor.

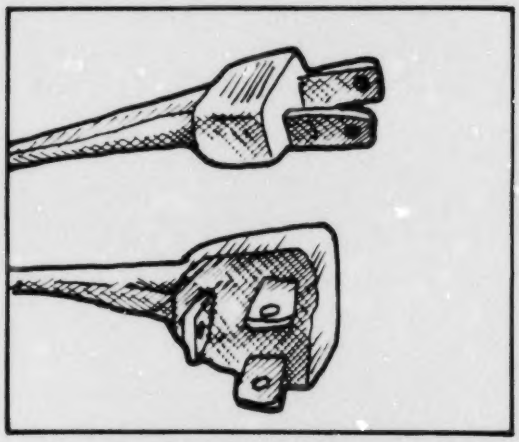


STEP 1 – Cheapest electric motor available.

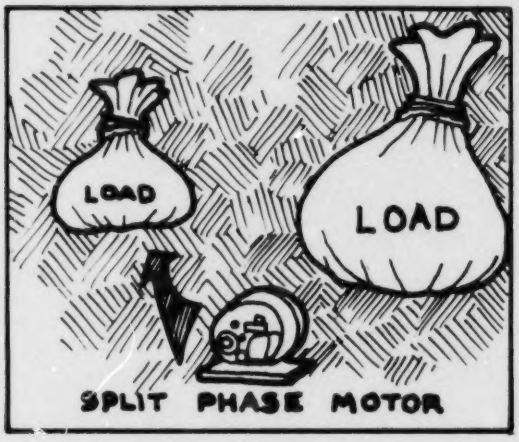
STEP 2 – Available in sizes from 1/20 – 3/4 horsepower.



STEP 3 – Operates on single-phase power.



STEP 4 – Operates on 120 or 240 volt circuit.



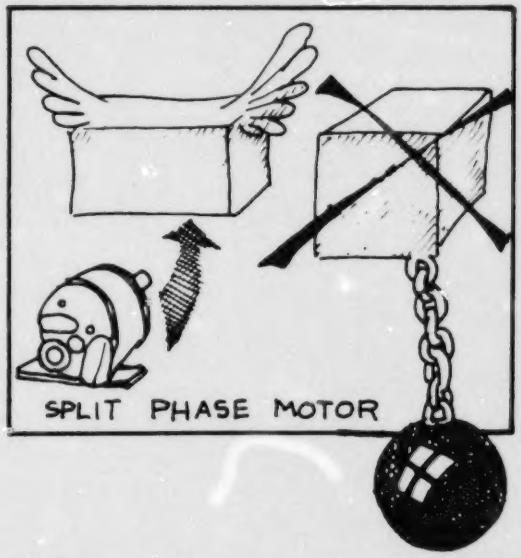
STEP 5 – Used on easy starting loads which require very little torque.

Check Point

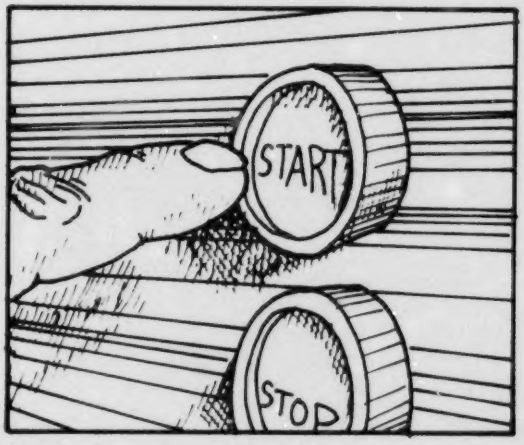
Using Worksheet II list 5 advantages of the split-phase motor.

Instructional Objective III

Each student will identify and list 3 disadvantages of a split-phase motor.



STEP 1 – Can handle only easy starting loads; cannot be used with heavy starting load machine.



STEP 2 – Consumes six to eight times operating current when starting.

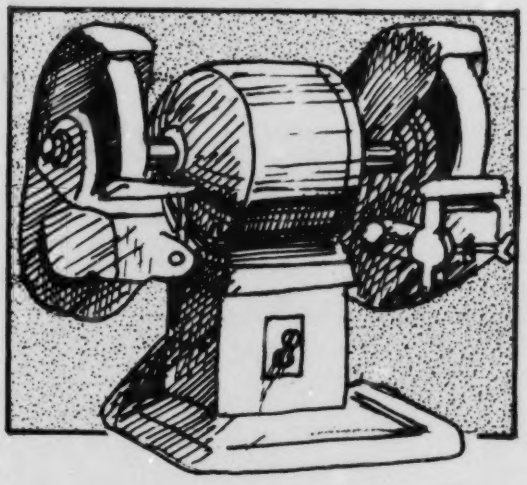
STEP 3 – May cause lights to flicker when starting due to its heavy use of electrical starting power.

Check Point

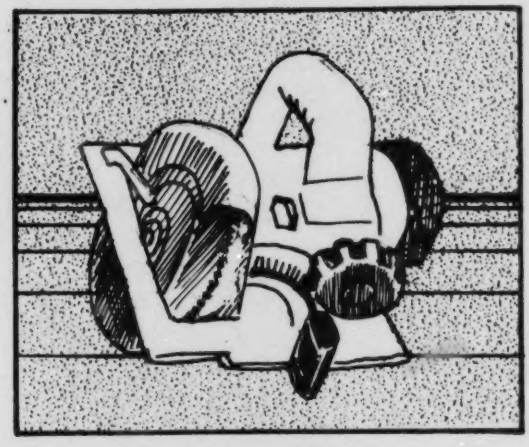
On Worksheet II list 3 disadvantages of the split-phase motor.

Instructional Objective

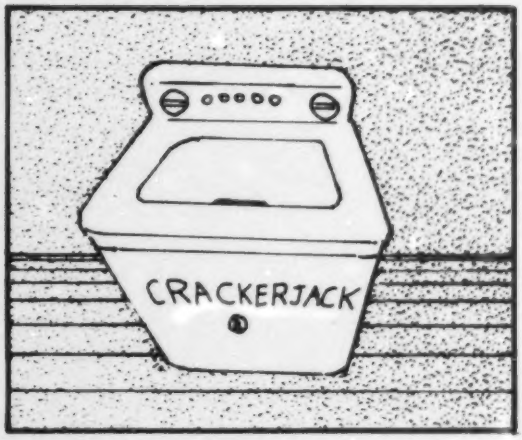
Each student will identify 5 machines operated with the use of a split-phase motor.



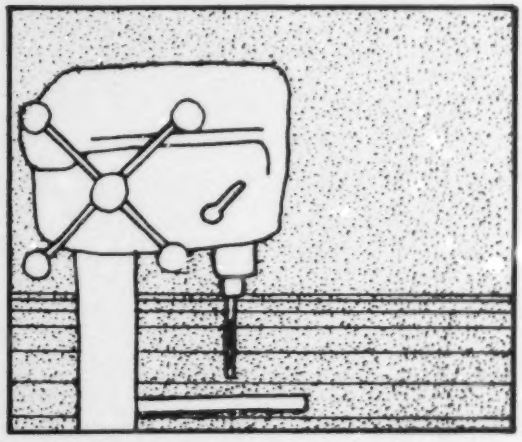
STEP 1 – A bench grinder's stone wheels operate from a split-phase motor.



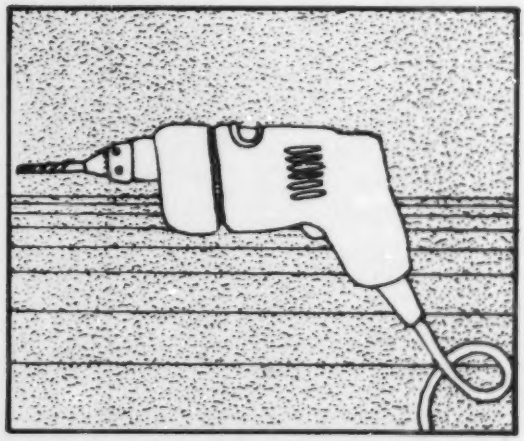
STEP 2 – An electric handsaw uses a split-phase motor to turn the blade.



STEP 3 – A washing machine operates because of a split-phase motor.



STEP 4 – A drill press uses a split-phase motor.



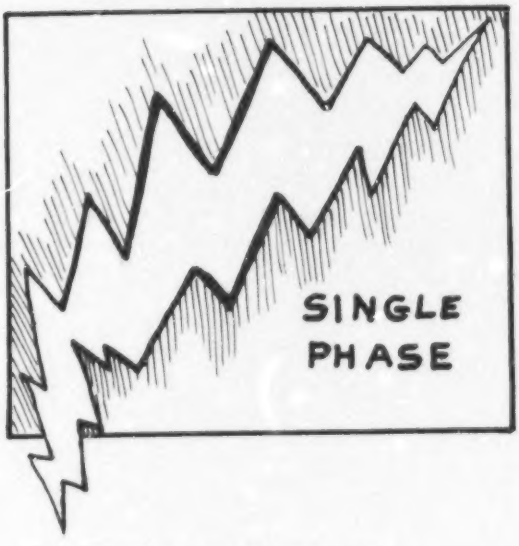
STEP 5 – Also, most electric hand tools, like this hand drill, operate with a split-phase motor.

Check Point

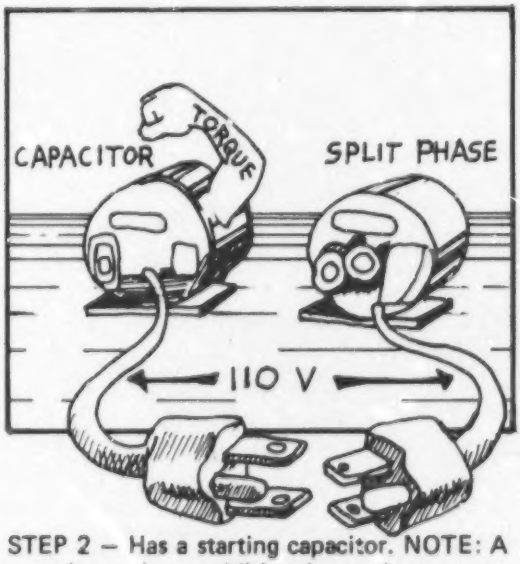
On Worksheet 11 list 5 tools using a split-phase motor.

Instructional Objective

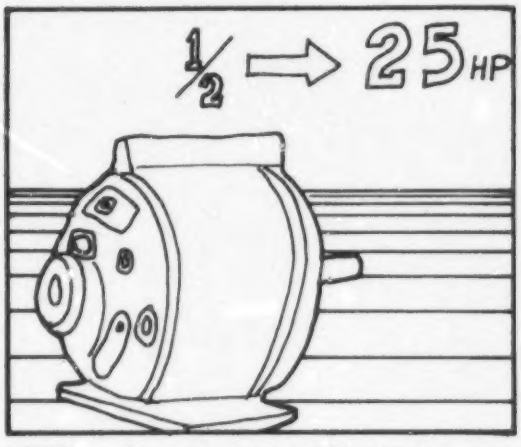
Each student will identify the advantages of a capacitor-type electric motor.



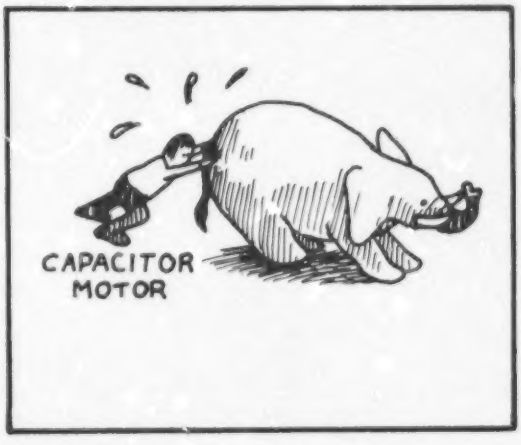
STEP 1 – Uses single-phase power.



STEP 2 – Has a starting capacitor. NOTE: A capacitor gives additional starting torque without requiring additional amperage.



STEP 3 – Sizes range from 1/2 to 25 hp.



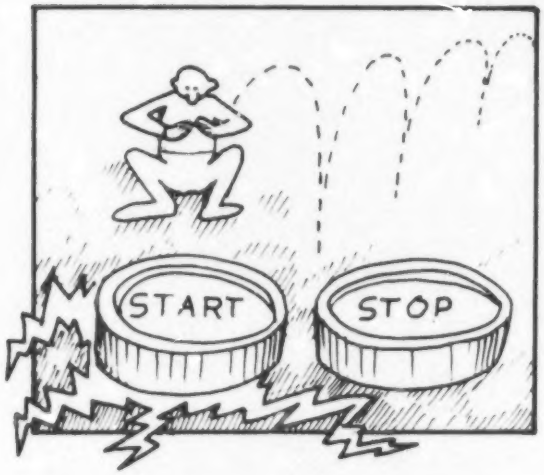
STEP 4 – Used on hard-to-start loads.

Check Point

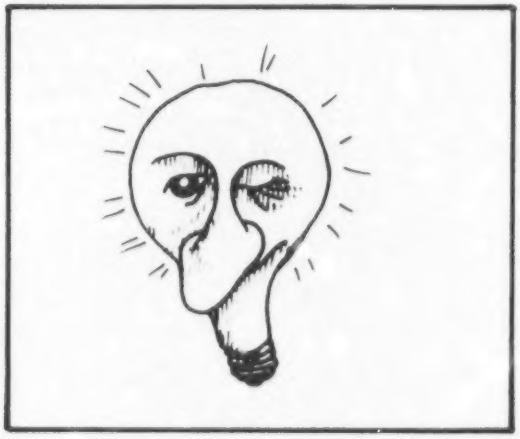
On Worksheet III write 4 advantages of a capacitor-type electric motor.

Instructional Objective VI

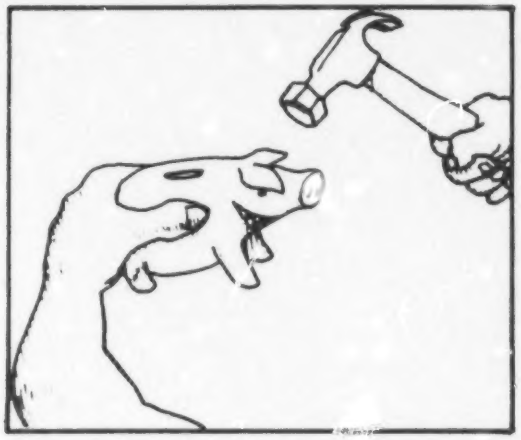
Each student will identify 4 disadvantages of a capacitor-type motor.



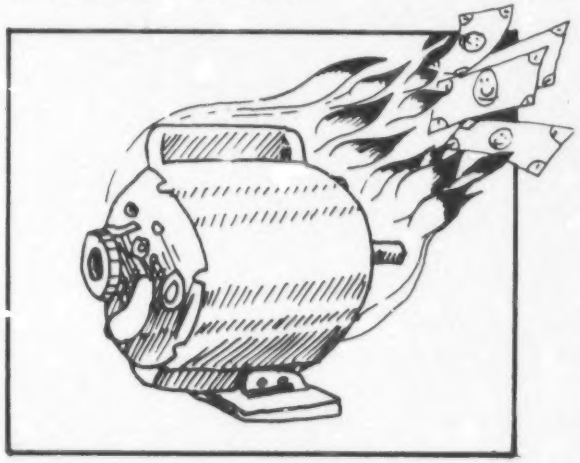
STEP 1 – Draws some excessive current when starting.



STEP 2 – May cause lights to blink because of the power it uses.



STEP 3 – High cost – 25 to 40% more than same size split-phase motor.



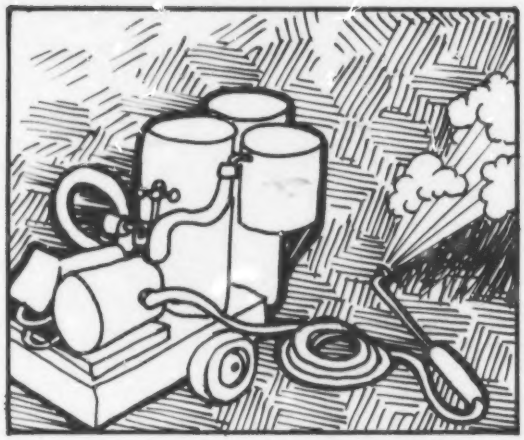
STEP 4 – Sizes above 1 hp cost 30 to 40% more than three-phase.

Check Point

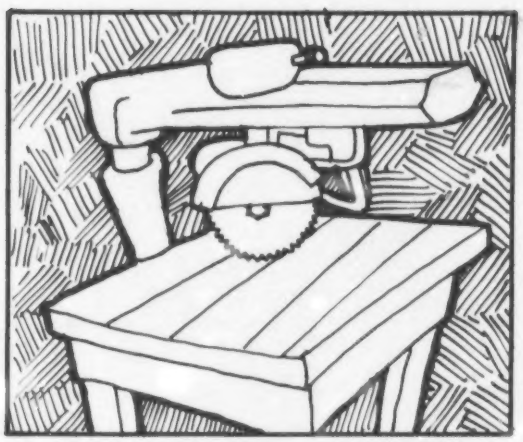
Using Worksheet III write 4 disadvantages of a capacitor motor.

Instructional Objective VII

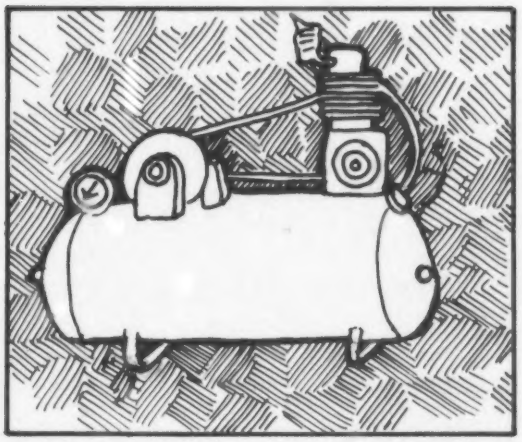
Each student will identify three machines operated by a capacitor motor.



STEP 1 – A steam cleaner uses a capacitor motor.



STEP 2 – All radial arm saws have capacitor motors.



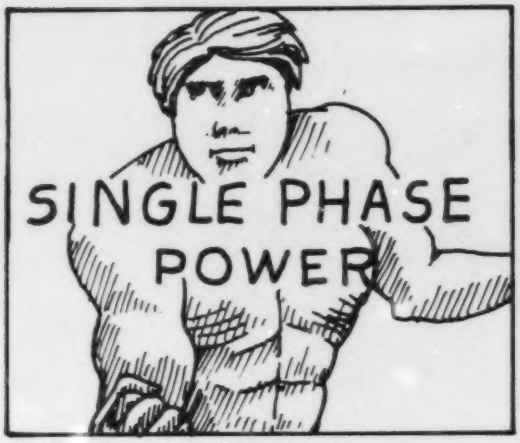
STEP 3 – Many air compressors use capacitor motors.

Check Point

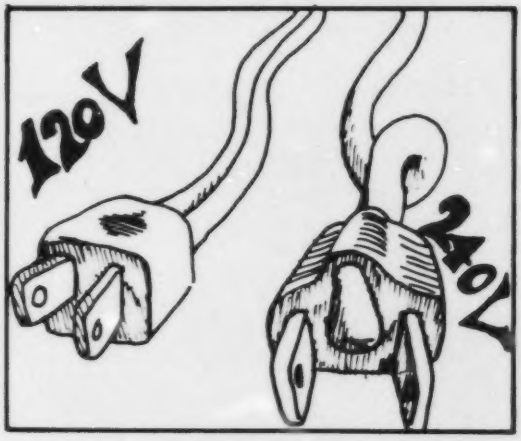
Using Worksheet III list 3 machines operated by capacitor-type motors.

Instructional Objective VII

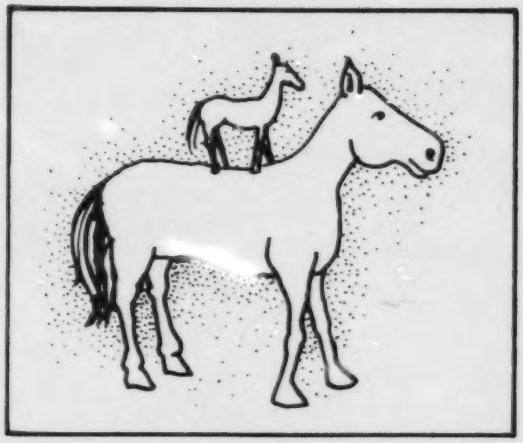
Each student will write 4 advantages of the repulsion-start induction-run motor.



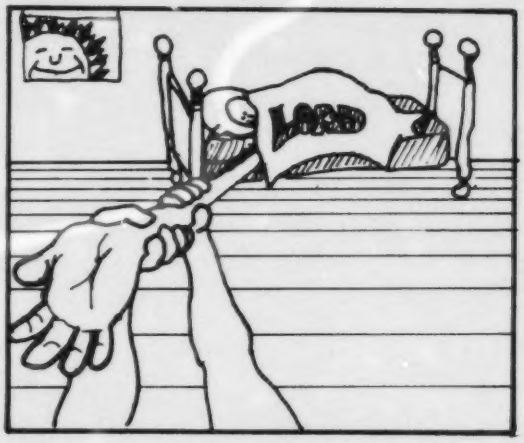
STEP 1 – Uses single-phase power.



STEP 2 – Requires 120 volt or 240 volt power.



STEP 3 – Sizes range from 1/6 - 20 hp.



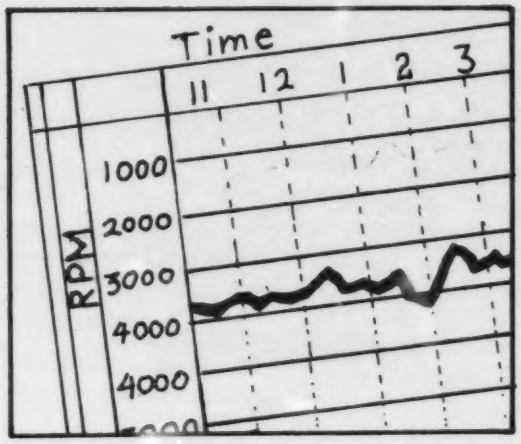
STEP 4 – Used on very hard-to-start loads.

Check Point

Using Worksheet IV write 4 advantages of a repulsion-induction motor.

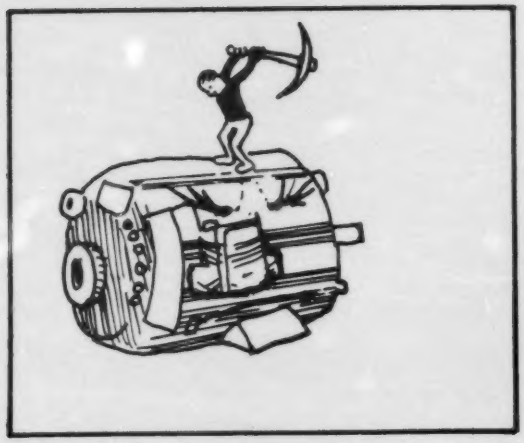
Instructional Objective IX

Each student will list 3 disadvantages of the repulsion-induction motor.



STEP 1 – Speed will not remain constant; can vary 5 – 10%.

STEP 2 – High initial cost.



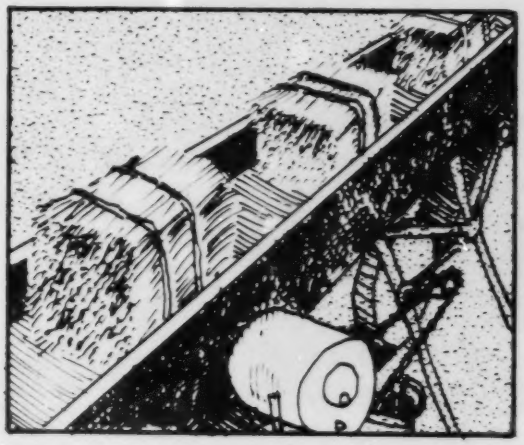
STEP 3 – Mechanical parts require some periodic maintenance.

Check Point

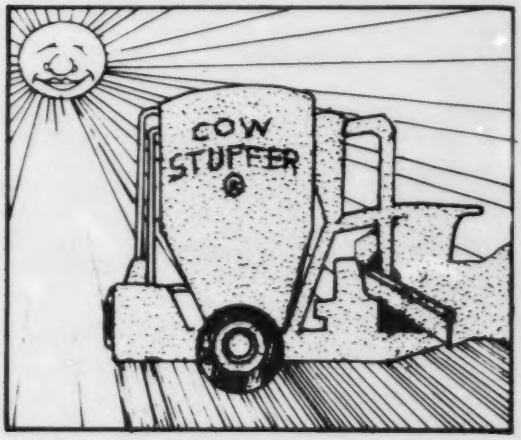
On Worksheet IV list 3 disadvantages of the repulsion-induction motor.

Instructional Objective

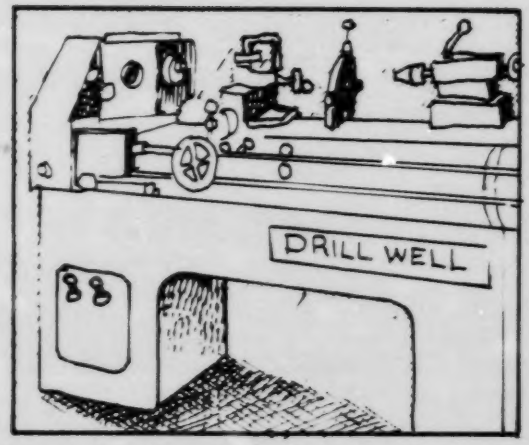
Each student will identify 3 machines using a repulsion-induction motor.



STEP 1 – Feed conveyors on farm equipment use repulsion-induction motors.



STEP 2 – The hammer mill on a feed mixer uses a repulsion-induction motor for difficult loads and for high revolutions per minute.



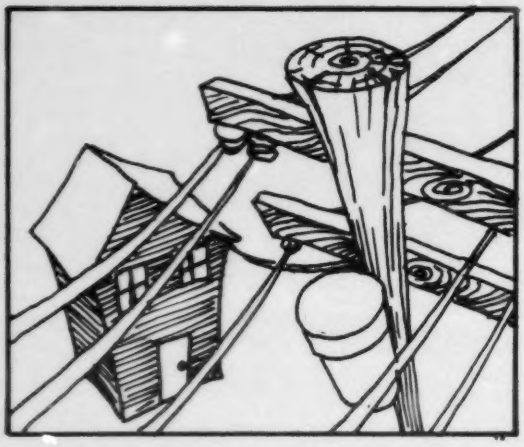
STEP 3 – Heavy equipment like this metal lathe is powered by the use of a repulsion-induction motor.

Check Point

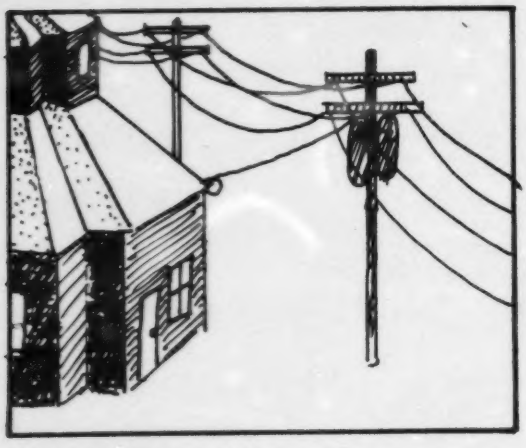
On Worksheet IV list 3 machines powered by a repulsion-induction motor.

Instructional Objective XI

Each student will determine the difference between single- and three-phase electricity.



STEP 1 – Single-phase electricity – the type of electricity that is supplied by one transformer from the power pole to a building.



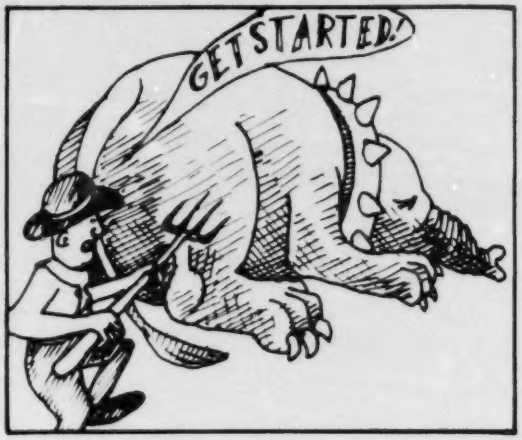
STEP 2 – Three-phase electricity – the type of electricity that is supplied by two transformers from the power pole to a building.

Check Point

Using Worksheet V fill in the blanks which identify single- and three-phase electricity.

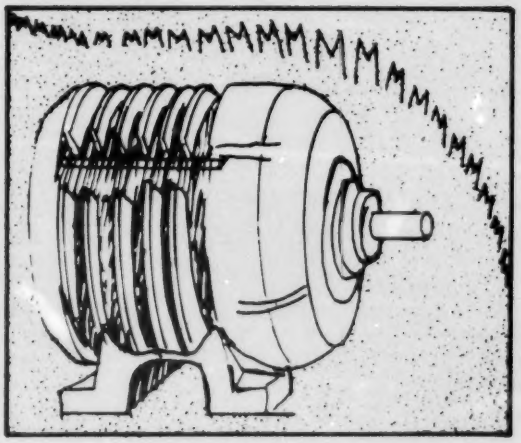
Instructional Objective XII

Each student will identify 4 advantages of a three-phase motor.

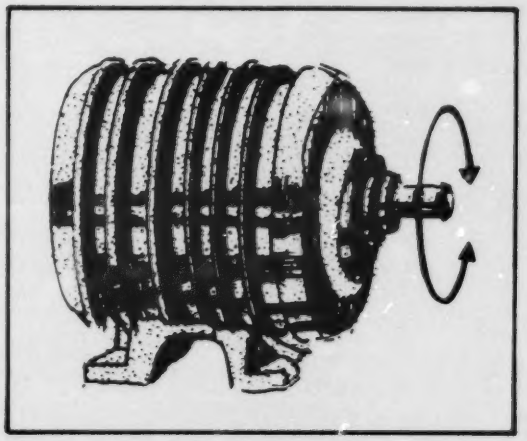


STEP 1 – Used on difficult starting loads.

STEP 2 – Most rugged, reliable, satisfactory motor you can select.



STEP 3 – Runs at constant speed.



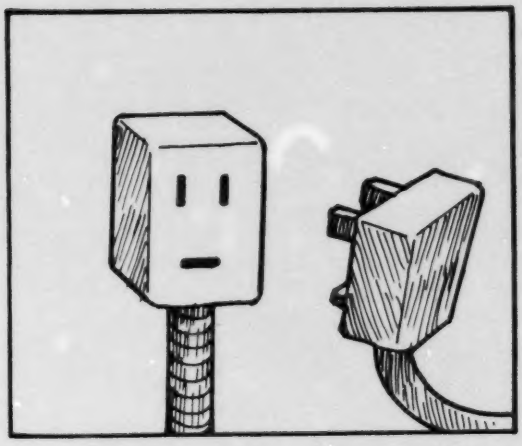
STEP 4 – Direction of rotation is very easy to change; either clockwise or counterclockwise.

Check Point

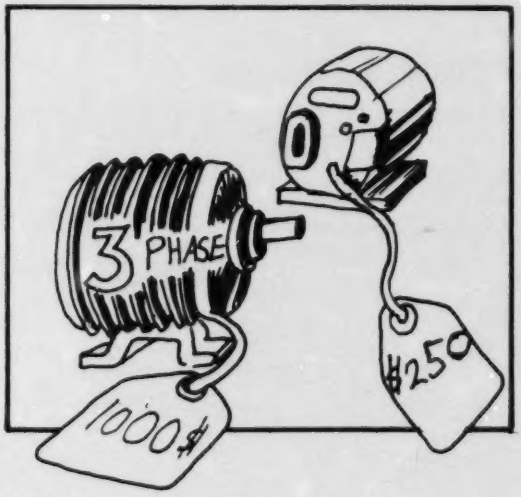
On Worksheet V list 4 advantages of a three-phase motor.

Instructional Objective XII

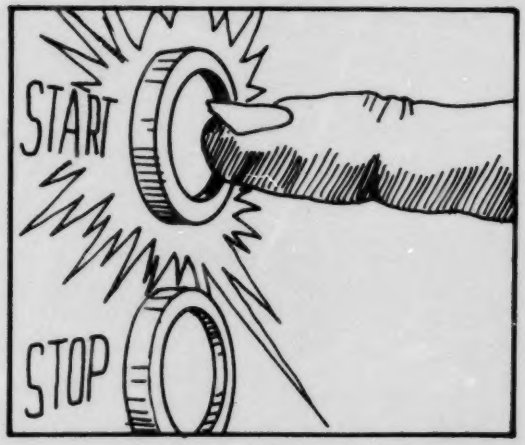
Each student will list 4 disadvantages of a three-phase motor.



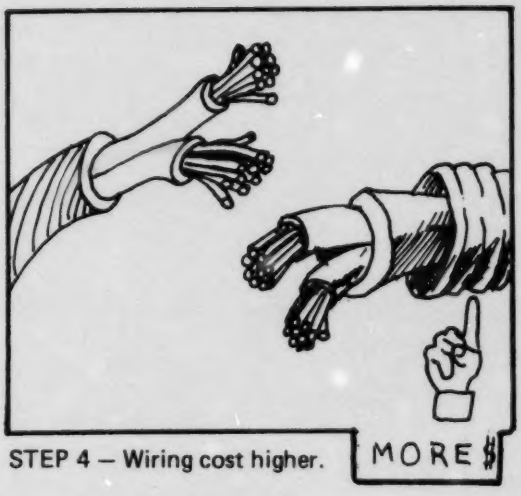
STEP 1 – Requires three-phase electrical service.



STEP 2 – Fractional horsepower size – high cost.



STEP 3 – Draws 3 to 4 times running current when starting.



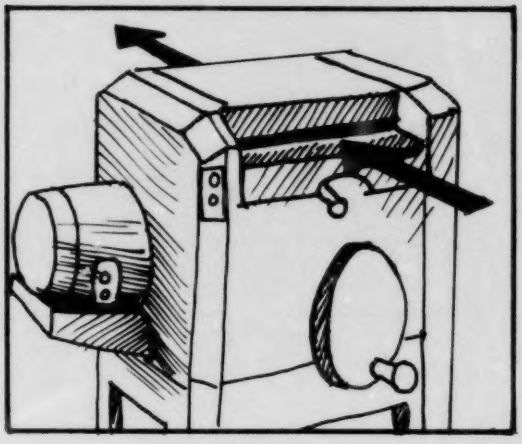
STEP 4 – Wiring cost higher.

Check Point

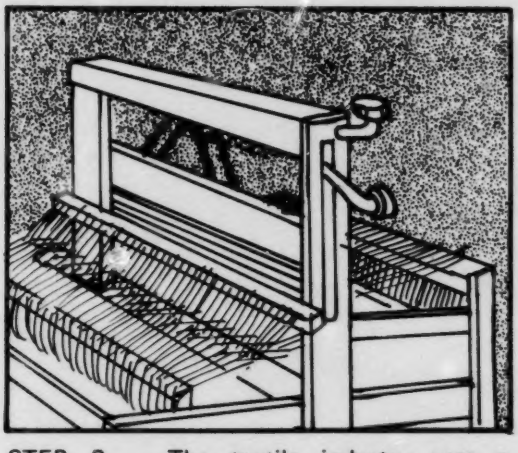
Using Worksheet V list 4 disadvantages of the three-phase motor.

Instructional Objective XIV

Each student will identify 2 machines which use a three-phase motor.



STEP 1 – Woodworkers use a planer to reduce the thickness of lumber. This machine uses a three-phase motor.



STEP 2 – The textile industry uses a three-phase motor to power many of its looms.

Check Point

On Worksheet V identify 2 machines powered by a three-phase motor.

Instructional Objective XV

Given a comparison chart of electric motors, each student will answer 10 questions comparing split-phase, repulsion-induction, capacitor, and three-phase electric motors.

STEP 1 – Read the chart.

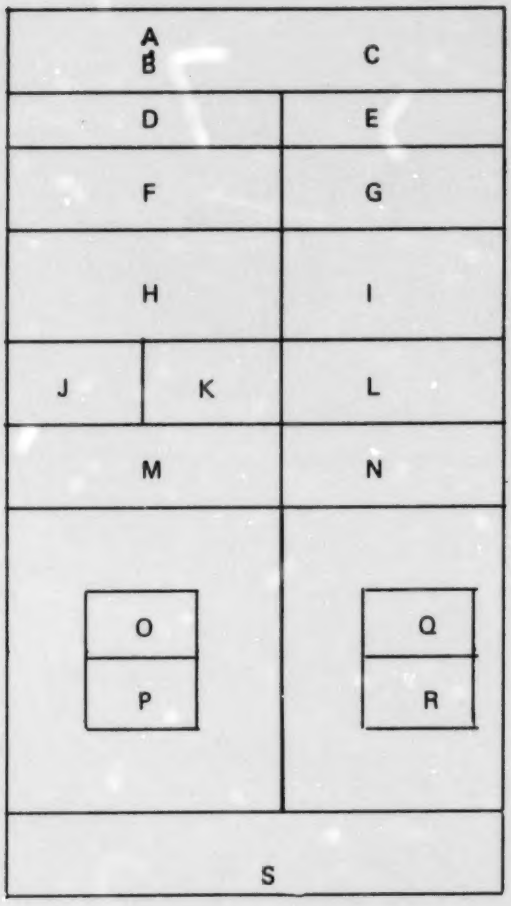
Type Load	Motor Type	Size Hp-Range	Electrical Power Requirements Phase	Electrical Power Requirements Voltage	Speed Range rpm's	Reversible	Relative Cost
Easy Starting Loads	Split-phase	1/20 – 3/4	Single	Usually 120	900 1200 1800 3600	yes	low
	Repulsion-induction	1/6 – 20	Single	120/240	1200 1800 3600	yes	moderate to high
Difficult Starting Loads	Capacitor	1/2 – 25	Single	120/240	900 1200 1800 3600	yes	moderate
	Three-phase	1/2 – 400 or more	Three	120-240 240-480 or higher	900 1200 1800 3600	yes	very low

Check Point

Answer all the questions found on Worksheet VI.

Instructional Objective XVI

Each student will identify and label the parts of a motor nameplate.



STEP 1 – Above is a sample motor nameplate. Although this may seem very complex, the terms are defined in the following step.

STEP 2 – Read below the types of information that is found on the motor nameplate. Locate the letter on the nameplate and the explanation of each.

A. Type of electrical current – alternating or direct.
B. Single-phase or three-phase
C. Motor type – manufacturer's symbol
D. Type of overload protection
E. Refers to the type of motor – A – represents split-phase – this also is a manufacturer's symbol.
F. Horsepower
G. Type of frame
H. RPM – Indicator speed of the motor's shaft.
I. Cycle – will have the number of cycles only if the motor is alternating current.
J. Temperature at which motor is to operate
K. Hours which the motor can be operated continuously
L. Special manufacturer's characteristic
M. Serial number – must be used when ordering parts
N. Motor style
O,Q. Voltage on which the motor may operate
P,R. Corresponding amps that motor will pull when using either voltage.
S. Type of motor enclosure

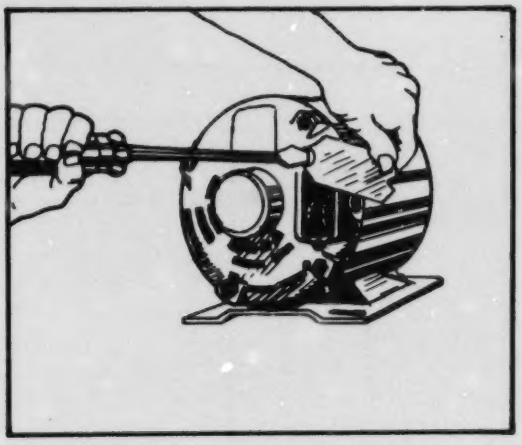
Check Point

Using information found in STEP 2, answer Worksheet VII concerning this sample motor nameplate.

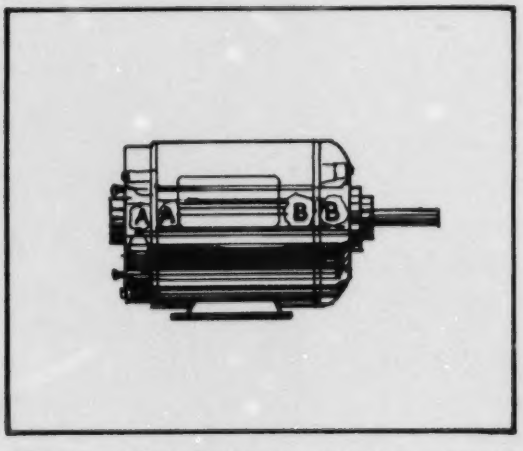
A.C. 3 PH		Motor Type AF	
Thermoguard Type		A	
HP 1/2		Frame 186	
R P M 1700		C Y 60 C	
C 40	Hours Cont	Locked KV–A	
Serial 76851-B		Style GO	
Volts 120 Amps 7		Volts 240 Amps 3-5	
OPEN			

Instructional Objective XVII

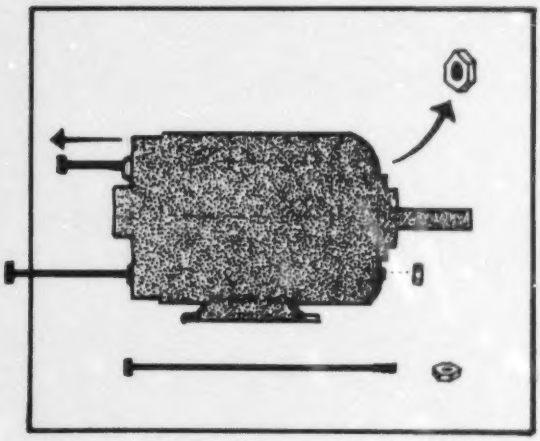
Students working in pairs will disassemble a split-phase motor and clean the points.



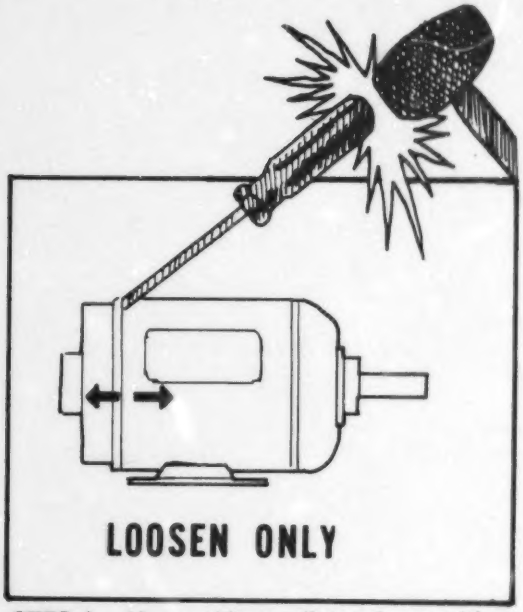
STEP 1 – Using a screwdriver unscrew the screws which secure the switch plate to the motor.



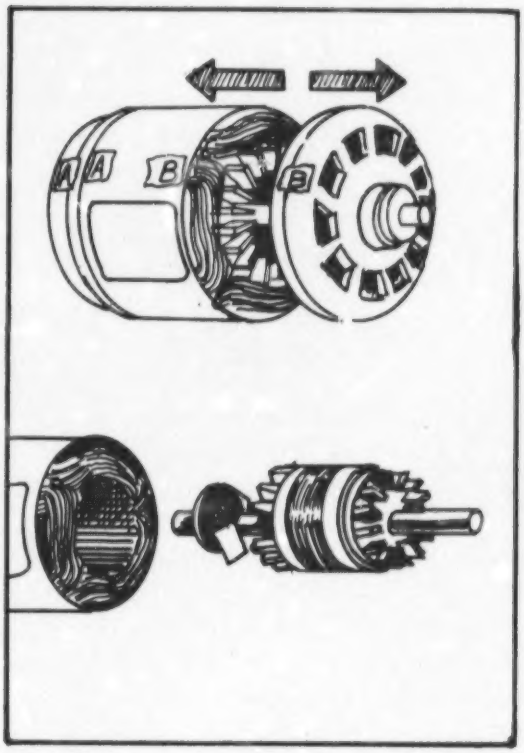
STEP 2 – Mark the bell ends with a piece of tape. Identify them as ends A and B.



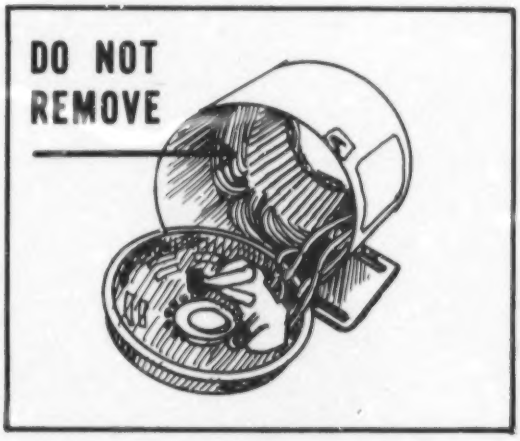
STEP 3 – Remove bolts holding end bells.



STEP 4 – Use a rubber mallet and screwdriver to tap each end bell to loosen.

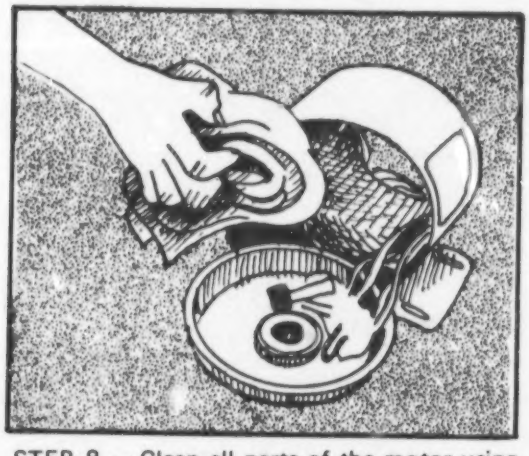


STEP 5 – Remove bell end that does not contain the starting switch. Observe position and number of shims as you remove the rotor



STEP 6 – Remove bell end that contains the switch. NOTE: Do not remove stator.

STEP 7 – Use very fine sandpaper to clean points.



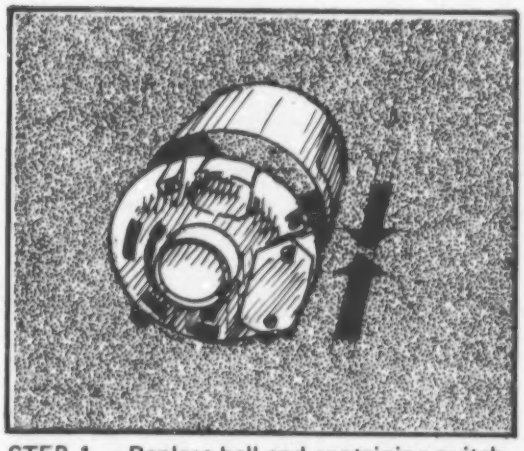
STEP 8 – Clean all parts of the motor using rags.

Check Point

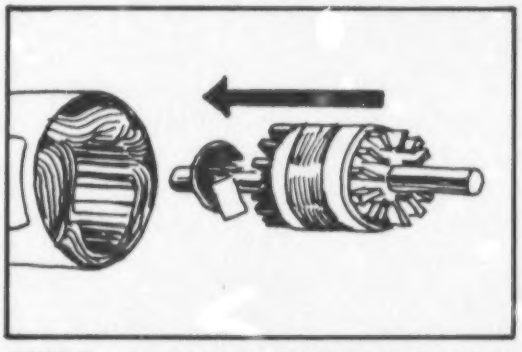
Have your instructor inspect the clean points.

Instructional Objective XVII

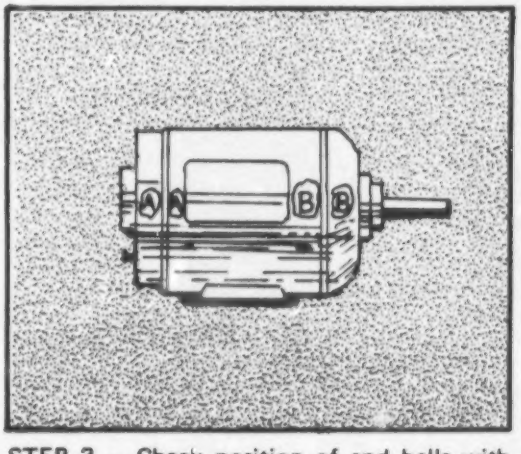
Both students will reassemble the motor.



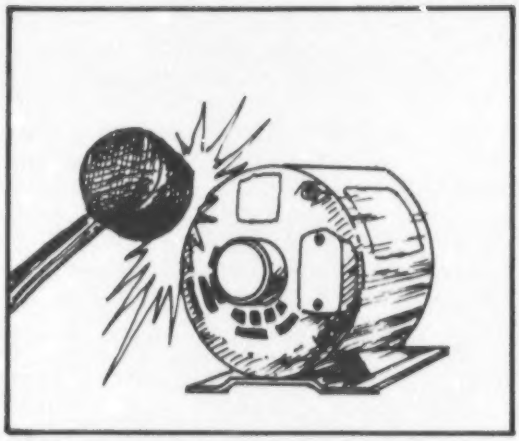
STEP 1 – Replace bell end containing switch,



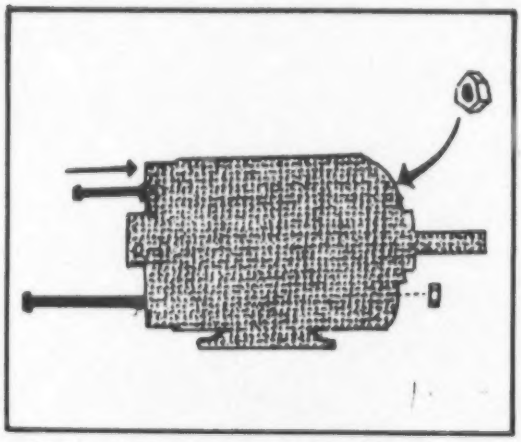
STEP 2 – Insert rotor making sure the shims are in place.



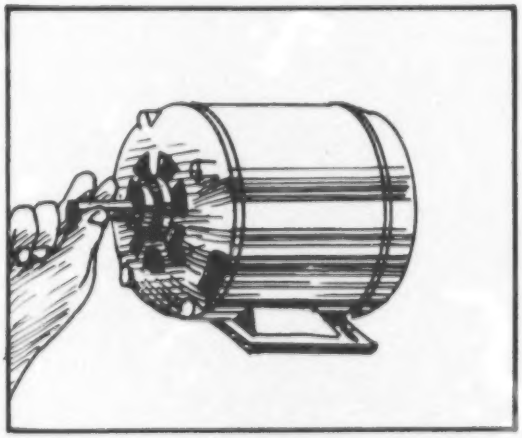
STEP 3 – Check position of end bells with taped marks.



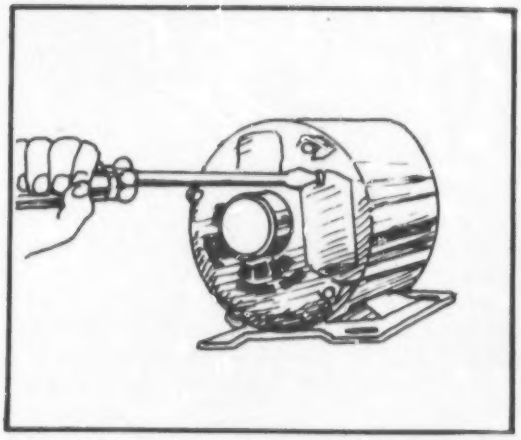
STEP 4 – Use rubber hammer to tap bells in place.



STEP 5 – Insert end bell bolts and tighten.



STEP 6 – Turn shaft by hand (If the shaft is tight, bells may not be in proper alignment, or the friction may be between the bearing and shaft.)



STEP 7 – When shaft turns freely, reconnect switch.

Check Point

Ask your instructor to check the reassembled motor.

824.261-010 ELECTRICIAN (any ind.) wirer.

Plans layout, installs, and repairs wiring, electrical fixtures, apparatus, and control equipment: Plans new or modified installations to minimize waste of materials, provide access for future maintenance, and avoid unsightly, hazardous, and unreliable wiring, consistent with specifications and local electrical codes. Prepares sketches showing location of wiring and equipment, or follows diagrams or blueprints, insuring that concealed wiring is installed before completion of future walls, ceilings, and flooring. Measures, cuts, bends, threads, assembles, and installs electrical conduit, using such tools as hacksaw, pipe threader, and conduit bender. Pulls wiring through conduit, assisted by ELECTRICIAN HELPER (any ind.). Splices wires by stripping insulation from terminal leads with knife or pliers, twisting or soldering wires together, and applying tape or terminal caps. Connects wiring to lighting fixtures and power equipment, using handtools. Installs control and distribution apparatus, such as switches, relays, and circuit-breaker panels, fastening in place with screws or bolts, using handtools and power tools. Connects power cables to equipment, such as electric range or motor, and installs grounding leads. Tests continuity of circuit to insure electrical compatibility and safety of components, using testing instruments, such as ohmmeter, battery and buzzer, and oscilloscope. Observes functioning of installed equipment or system to detect hazards and need for adjustments, relocation, or replacement. May repair faulty equipment or systems [ELECTRICAL REPAIRER (any ind.)]. May be required to hold license. May cut and weld steel structural members, using flamecutting and welding equipment. May be designated according to work location as MINE ELECTRICIAN (mining & quarrying).

801.137-010 SUPERVISOR, ASSEMBLY (agric. equip.)

Supervises and coordinates activities of workers engaged in assembling balers, combines, motors, tractors, lawn mowers, rotary tillers, and other agricultural and lawn/garden machines and equipment: Coordinates work of production and stock control departments to maintain flow of material to assembly line. Inspects defective parts and directs routing of rejects to salvage or rework department. Investigates and determines causes of assembly defects and orders corrective action. Studies present layout of equipment to effect changeover of assembly line for processing new models. Performs other duties as described under SUPERVISOR (any ind.). May be designated according to component assembled as MOTOR-ASSEMBLY SUPERVISOR (agric. equip.).

721.281-018 ELECTRIC-MOTOR REPAIRER (any ind.)

Repairs electric motors, generators, and equipment, such as starting devices and switches, following schematic drawings, and using handtools, coil-winding machines, power tools, and test equipment: Disassembles and removes armature, stator, or rotor from housing. Examines coil connections for broken or defective wiring. Tests coils, armatures, stator, rotor, and field coils for continuity, shorts, and grounds and insulation resistance, using test lamp, ammeter, and ohmmeter. Cuts out or removes defective coils and removes insulation from core slots. Cuts and forms insulation and inserts insulation into armature, rotor, or stator slots. Rewinds coils on core while in slots manually or makes replacement coils, using coil-winding machine. Installs and alines prewound coils in slots, using hammer, drift, or mallet. Replaces defective coil leads and solders connections of coils in specified sequence. Examines bearings, shafts, and other moving parts for excessive wear or defects. Refaces commutators and machines parts to specified tolerances, using machine tools. Assembles and tests motor for specified performance. May be designated according to size of motor repaired as FRACTIONAL-HORSEPOWER MOTOR REPAIRER (any ind.); equipment repaired as DYNAMOTOR REPAIRER (any ind.); or part repaired as ARMATURE STRAIGHTENER (elec. equip.); COIL-CONNECTOR REPAIRER (elec. equip.); COMMUTATOR REPAIRER (any ind.); FIELD-COIL REPAIRER (elec. equip.); STATOR REPAIRER (any ind.).